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(54) PROCESS FOR TREATING UREA GRANULES

(71) We, STAMICARBON B.V., (formerly Stamicarbon N.V.), a Netherlands Limited Liability Company of P.O. Box 10, Geleen, the Netherlands (formerly of 2 van der Maesenstraat, Heerlen, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for reducing the absorption of moisture of urea granules by treating the said granules with a coating agent comprising a mineral oil, 5 to 20 percent by weight of a mixture of solid paraffin and synthetic paraffin having a molecular weight of from 500 to 5,000 and a melting point between 85° and 115°C and present in a ratio from 4:1 and 1:4, and from 1% to 15% by weight of an animal or vegetable fat or oil. The invention is an improvement on the invention described and claimed in our Patent 1,288,333 hereinafter referred to as "the main Patent".

An essential feature of the process according to the main patent is that during the coating treatment the temperature of the urea granules is kept between 30 and 65°C. By keeping the temperature above 30°C it is ensured that the paraffin component of the coating agent solidifies at such a rate that the coating agent applied has sufficient time to spread over the entire surface of the granules and thus to encompass the granules completely. At too low a temperature of the granules the paraffin will rapidly crystallize, with the result, that the granules are only partially coated with a protective film and will soon absorb moisture, and deliquesce.

There is also an upper limit to the temperature of the granules to be coated by the process according to the main patent, because at temperatures over 65°C, i.e. above the melting point of the paraffin, a portion of the latter will be absorbed and thus be prevented from contributing to the protection of the granules, and, furthermore, because at higher

temperatures the addition reaction between the paraffin and the urea will proceed faster. Also at temperatures below 65°C these drawbacks occur to some extent and in practice the temperature of the granules is therefore lowered to 45—50°C. The said phenomena start during the coating treatment and, if the coated urea is subsequently stored in bulk, proceed for months since the inner portion of the stock pile cools only very slowly. The upper temperature limit constitutes a serious impediment when urea granules have to be coated, which are discharged from the granulating apparatus at a temperature above 65°C. For instance, when the granulation of the urea is carried out by the so-called prilling process, in which small spherical, or near-spherical granules are prepared by causing liquid droplets to solidify while falling through an upward flow of cooling air in a prilling tower, the urea granules are usually discharged from the prilling tower at a temperature from 70—75°C. If the above coating process is to be applied to urea granules obtained by prilling it is necessary either to use a higher prilling tower in order to ensure that the temperature at which the urea granules are discharged is sufficiently low or a cooling device such as a fluid bed cooler.

The present invention provides an improvement on the above process by which the aforementioned drawbacks have been eliminated. This improvement is obtained by using a coating agent as defined in the main patent, in which the solid paraffin component is composed of natural paraffin and synthetic paraffin, the latter having a molecular weight of 500—5000 and a melting point between 85 and 115°C, in a weight ratio from 4:1 to 1:4, the coating agent being applied at a temperature of the urea granules of 45—85°C.

The term "natural paraffin" denotes the paraffins which are produced by refining crude waxes obtained from mineral oil. The term "synthetic paraffin" covers both the paraffins obtained by catalytic hydrogenation of carbon monoxide under high pressure and tempera-

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ture in a Fischer-Tropsch synthesis, and the wax-like low molecular weight polymers obtained by polymerizing ethylene in a Ziegler-synthesis.

- 5 The composition of the paraffin mixture should so be chosen that the solidification point of the coating agent is not more than 15°C, preferably not more than 10°C, below the temperature at which the coated product will be stored. It is thus attained that the paraffin component solidifies in so short a time that it will not become partially ineffective as a surface coating due to absorption by the granules.

- 15 Example
Urea granules prepared by prilling were

sprayed with coating agents of various compositions in a rotary drum. The amount of coating agent applied was about 0.8 weight %. The coated granules were stored at temperatures of appr. 40°C, 60°C and 70—80°C and in each instance the rate of moisture absorption was determined after storing for 24 hours and for 2 months. The rate of moisture absorption, or dynamic hygroscopicity, was measured by storing a quantity of sample in an isolated space with a relative humidity of 80% at 25°C, and determining the moisture increase on the basis of the change in weight in % during 24 hours.

The compositions of the coating agents used and the results are listed in the following table.

TABLE												
35	composition of coating agent in weight %				melting point of mixture °C	dynamic storing		hygroscopicity after for 24 hours and 2 months				
	no.	mineral oil	natural paraffin	synthetic paraffin		soy-bean oil	40°C		60°C		70—80°C	
							24 h	2 m	24 h	2 m	24 hr	2 m
40	1	85	10	0	5	36	1.5	1.5	1.5	6	1.5	20
	2	85	8	2	5	55			2.5	3.5	2.5	12
	3	85	5	5	5	68				2.4	2	
	4	85	0	10	5	76				5.3	12	
	5	90	10	0	0					5	21	
	6	90	5	5	0					3	15	
45	7	90	0	10	0					5	24	

- It is seen that if a dynamic hygroscopicity of at most 5% per 24 hours is admissible, coating agent no. 2 gives satisfactory protection only if the urea is stored at a temperature not higher than about 60°C, whereas coating agent no. 3 can be used also at higher storage temperatures.

- Furthermore it can be noted from the results with coating agents no. 5, 6 and 7 that animal or vegetable oil or fat is an essential component of the coating mixture if a low dynamic hygroscopicity is to be maintained for longer periods of time.

WHAT WE CLAIM IS:—

1. A process for reducing the absorption of moisture of urea granules by treating the said granules with a coating agent comprising a mineral oil; from 5 to 20% by weight of a mixture of solid natural paraffin and synthetic paraffin having a molecular weight of from 500 to 5000 and a melting point between 85° and 115°C, the said natural and

synthetic paraffins being present in a weight ratio from 4:1 to 1:4; and 1 to 15% by weight of an animal or vegetable fat or an animal or vegetable oil, wherein the temperature of the urea granules during the said treatment is between 45 and 85°C.

2. A process according to claim 1, wherein the ratio of the quantities of natural and synthetic paraffin is such that the solidification point of the coating agent is not more than 15°C below the temperature at which the coated product will be stored.

3. A process of treating urea granules as claimed in claim 1 substantially as hereinbefore described in the Example.

4. Urea granules treated by the process according to any of claims 1 to 3.

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